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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/884,002	06/18/2001	Yasumitsu Ito	5576-126	3393

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EXAMINER	
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ART UNIT	PAPER NUMBER
1745	9

DATE MAILED: 07/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Offic Action Summary	Applicati n N .	Applicant(s)	
	09/884,002	ITO, YASUMITSU	
	Examiner	Art Unit	
	Raymond Alejandro	1745	

-- The MAILING DATE of this communication appears on the c ver sh et with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 June 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Amendment

This communication is responsive to the amendment filed on 06/21/03. The applicant has overcome the objection, the 35 USC 112 rejections and the 35 USC 102 and 103 rejections. However, the claims are finally rejected over new art for the reasons of record.

Priority

1. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Japan on 06/19/00. It is noted, however, that applicant has not *still* filed a certified copy of the 2000-182612 application as required by 35 U.S.C. 119(b).

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. The language "having catalyst layers on both sides thereof" in claims 1 and 11 is of uncertain meaning, thereby rendering the claims indefinite. The language "having catalyst layers on both sides thereof " is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree. It is uncertain whether the term "both sides thereof" refers

to the anion exchange membrane, the cation exchange membrane or both. Further clarification is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato 6127059 in view of Hitchems et al 6103078.

The instant claims are directed to solid polymer fuel cells wherein the claimed inventive concept comprises the specific exchange membrane material employed therein. Other limitations include the gas passages; the polymer materials; the carbon paper; and the membrane positioning.

With respect to claims 1-2, 9 , 11 and 17:

Kato discloses the following (COL 6, lines 32-42/Figure 2):

> In FIG. **2**, the above-mentioned gas diffusion layer/ collector **14** was positioned on both sides of a membrane/ electrode junction **11** in which the catalyst layers **11***a* and **11***b* were integrated, this was sandwiched between separators **12**, and a single-cell solid polymer electrolyte fuel cell was assembled according to conventional assembly techniques. The gas diffusion layer/collector **14** had the water-repellent conductive layer **14***b* on the inside, and the carbon fiber cloth **4***a* on the outside. Gas channels were formed in the separators **12**. **13** is a gasket.

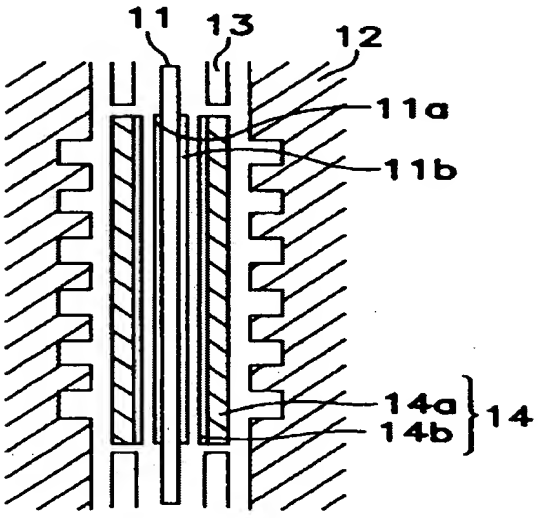

FIG. 2

It is apparent from Figure 2 above that the catalyst layers 11a and 11b are positioned on both sides of the membrane 11.

Kato also discloses the following (COL 3, lines 15-21):

> In another aspect, the invention provides a solid polymer electrolyte fuel cell including a solid polymer electrolyte having first and second surfaces, a catalyst layer disposed on each of the first and second surfaces, and the gas diffusion layer of this invention disposed adjacent to said catalyst layer disposed on each of the first and second surfaces.

Regarding claim 6:

It is disclosed that the gas diffusion layers comprises carbon paper (COL 1, lines 45-47) or carbon fiber woven cloth (COL 5, lines 44).

Kato discloses a solid polymer fuel cell according to the foregoing. However, Kato does not expressly disclose solid polymer electrolyte comprising the anion exchange membrane and the cation exchange membrane, the membrane materials and the channels and the fuel cell stack per se.

With respect to claims 1 and 11:

Hitchems et al disclose membranes with fluid distribution passages (Title/ABSTRACT) wherein the membrane can be a bipolar membrane wherein the cation-exchange membrane may be bonded to the anion exchange membrane by any method. Hitchems et al, however, disclose that it is preferred that the cation exchange membrane and the anion exchange membrane be adhered closely to each other to prevent separation of both the membranes when the bipolar membrane is used. Hitchems et al also disclose that this also applies to applications where the membranes are of like charge such as proton exchange membrane (PEM) for fuel cells (COL 14, lines 43-55).

It is also disclosed the following (ABSTRACT):

[57] **ABSTRACT**

The present invention provides improved ionically conducting membranes having internal passages therethrough and methods for making the improved membranes. The membranes may be formed from any ionically conducting material. In particular, the membranes may be formed of a single ionically conducting material, such as in a cation-conductive or anion-conductive membrane, or a plurality of ionically conducting material, such as in a bipolar membrane having a cation-selective region, an anion-selective region, and an interfacial region between the anion-selective region and the cation-selective region.

Thus, the cation exchange membrane and the anion exchange membrane are not in direct contact with each other.

With respect to claims 3-5 and 12-13:

It is disclosed that the ion exchange material can be a polymerizable monomer such as copolymers of tetrafluoroethylene and perfluorocarbon sulfonic acid or poly-sulfonyl fluoride

vinyl ether-containing pendant sulfonic acid groups which are used to produce NAFION (COL 8, lines 49-60). *These are ion exchange materials, which are acid resistant, too.*

As to claims 7-8, 10, 15-16 and 18:

> FIGS. **2A–2D** show the steps for forming a bipolar membrane having fluid distribution passages formed from a coated channel forming element, where the coating is formed from an ion-selective material.
>
> FIGS. **3A–3D** show the steps for forming a bipolar membrane having fluid distribution passages that were formed using an ion-conductive channel forming element.
>
> FIGS. **4A–4D** show the steps for forming a bipolar membrane formed using an embedded channel forming element.
>
> FIGS. **5A** and **5B** are bipolar membranes formed using different alignments for the two embedded channel forming elements.

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the solid polymer electrolyte comprising the anion exchange membrane and the cation exchange membrane of Hitchems et al in the fuel cell of Kato as Hitchems et al teach that bipolar membranes can be used as proton exchange membranes (PEM) for fuel cell applications as the bipolar membranes provide improved ionically conducting medium.

With respect to the specific membrane materials, it would have been obvious to one skilled in the art at the time the invention was made to use the specific membrane materials of Hitchems et al to make the cation and anion exchange membrane of Kato as Hitchems et al disclose that such specific membrane materials are suitable because they exhibit satisfactory ionically (cation and anion) conductivity characteristics.

As to the specific channels, it would have been obvious to one skilled in the art at the time the invention was made to membrane of Kato by having channels as Hitchems et al disclose that the improved membranes including fluid passages therein facilitate the transport of fluids into and/or out of the membrane, regardless of whether the particular membrane is cation-conductive, anion conductive or bipolar. Accordingly, the fluid passages allow fluid to be delivered directly into the membrane, instead of relying upon the diffusion of fluid from the face of the membrane, either with or against the electroosmotic flow of fluid through the membrane. This direct fluid delivery can be useful in many applications, such as electrochemical cells, where the rate of ion transport through a typical ionically conductive membrane is limited by the amount of water available to the membrane.

As far as the fuel cell stack itself, it would have been obvious to one skilled in the art at the time the invention was made to make the fuel cell of Kato by forming a fuel cell stack per se because by combining an individual fuel cell unit with multiple fuel cell units otherwise known as stacking, increases generating capacity amounting to a quantity of useful electrical and thermal energy is obtained. The serial array of individual fuel cell units, creates a complete fuel cell, sometimes known as a fuel cell stack. Since both Kato and Hitchems et al disclose single fuel cell units, it would be obvious to combine many fuel cell units together to make a high power generating fuel cell system.

Response to Arguments

7. Applicant's arguments with respect to claims 1-18 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (703) 306-3326. The examiner can normally be reached on Monday-Thursday (8:30 am - 7:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's primary examiner, Steve Kalafut can be reached on (703) 308-0433. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.